Environmental Impacts of Demand Response Resources

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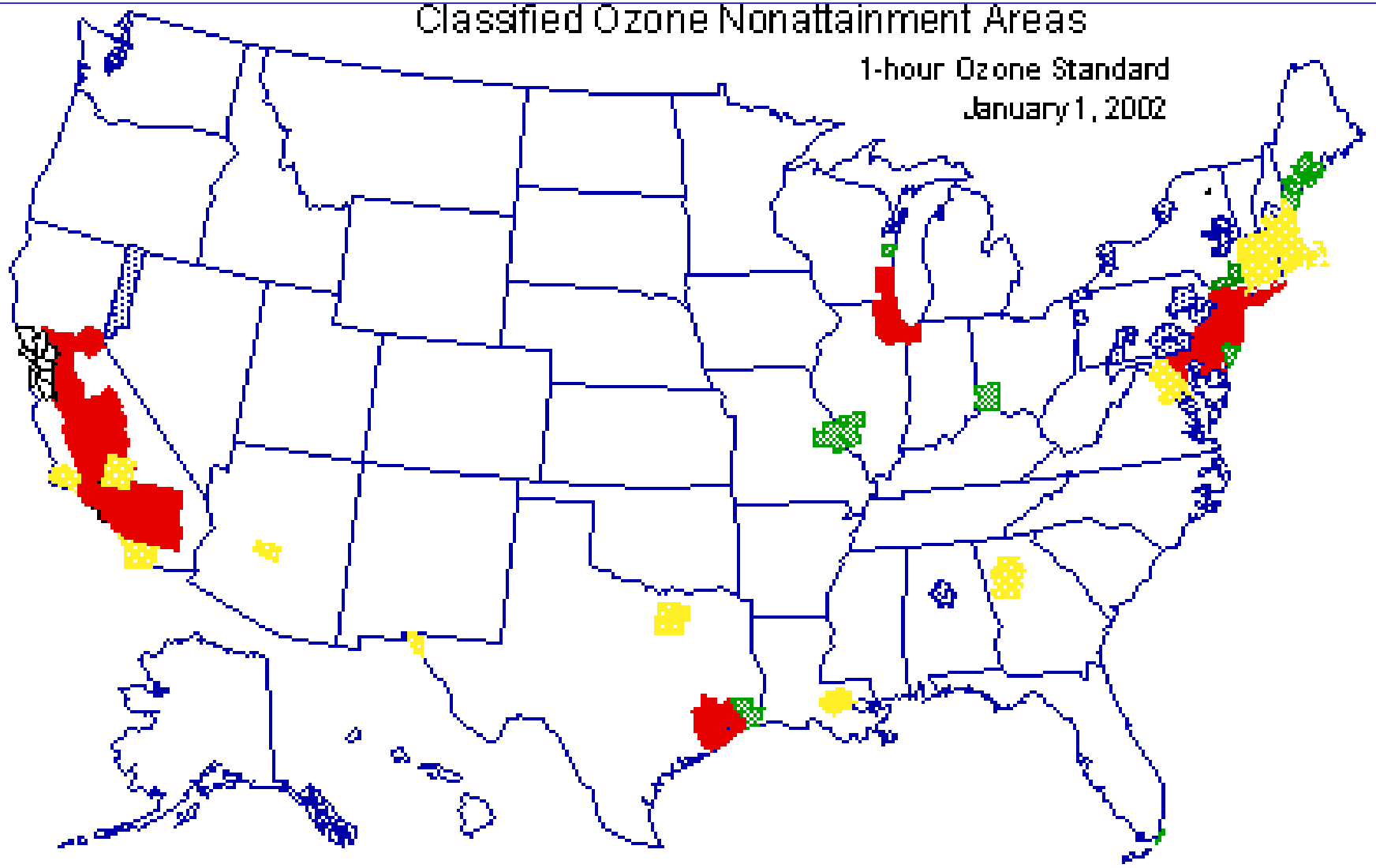
Overview

- Electric power generation degrades air quality at summer peak
- Demand response options can reduce or exacerbate air pollution at summer peak
- Clear environmental winners - energy efficiency, PV, fuel cells, wind
- Recommendations

Classified Ozone Nonattainment Areas

1-hour Ozone Standard
January 1, 2002



Classifications

Extreme (LA) & Severe | Serious | Moderate | Marginal

San Francisco is Classified Other / Sec 185A & Incomplete Data Areas Not Included

mapbook.mxd

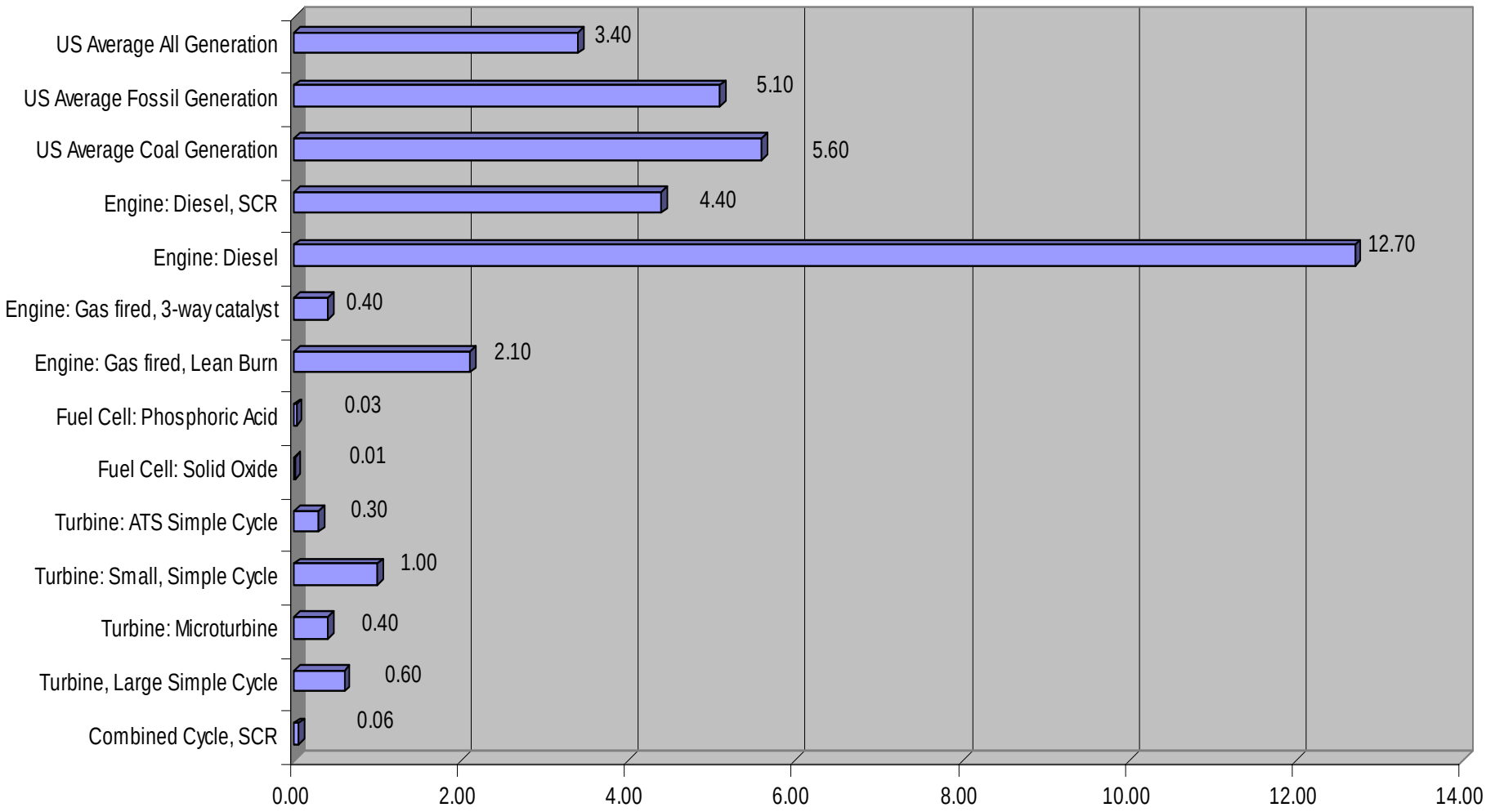
Demand Response Options

- Energy Efficiency - High Efficiency AC Systems, Commercial Lighting
- Load Curtailment - Reduced lighting, AC cutbacks, suspended operations
- Load Shifting - Rescheduled industrial processes, AC & Water Heater Cycling
- Distributed Generation - Emergency generators, fuel cells, PV, combined heat & power

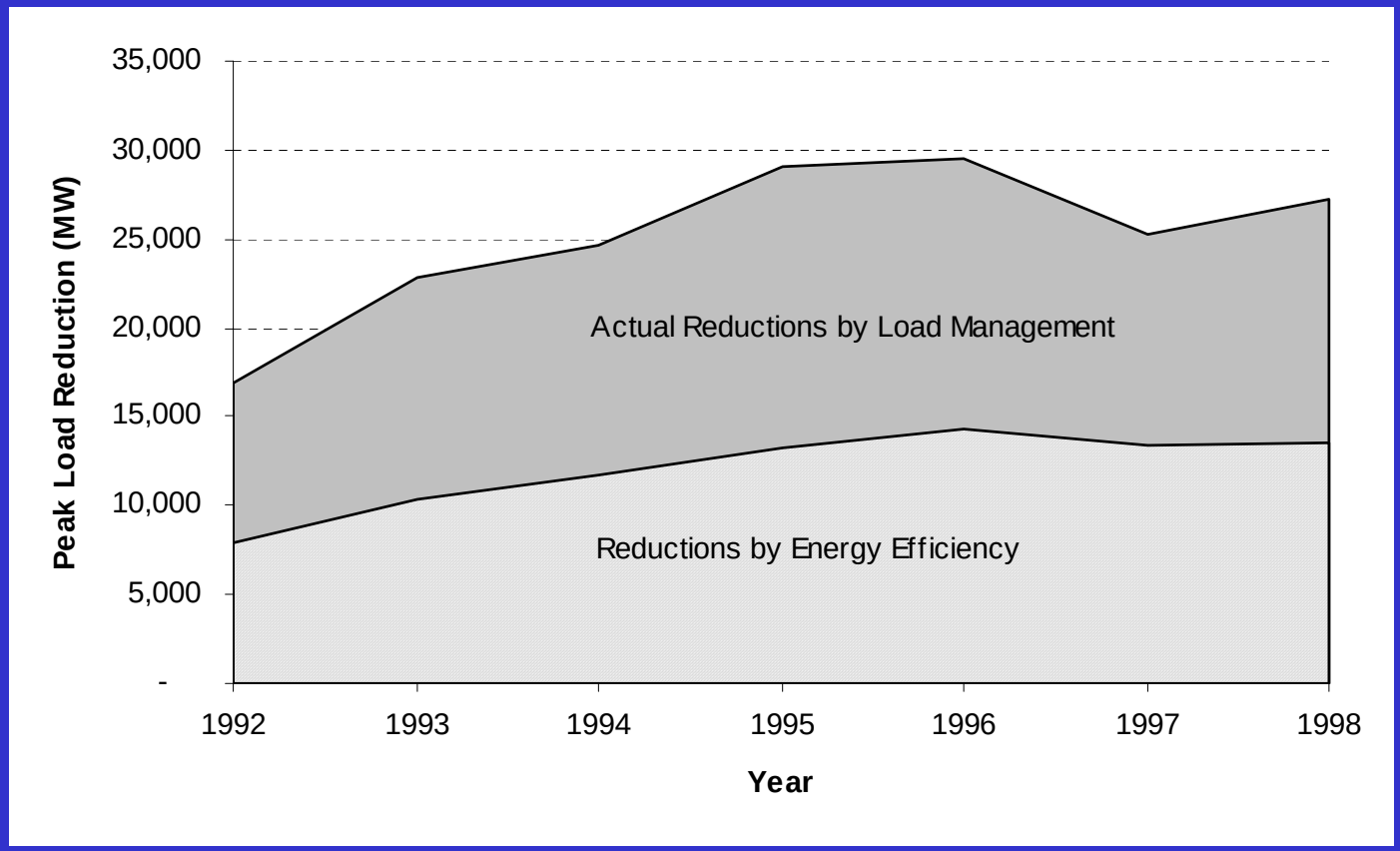
Environmental Impacts - Power Plant Air Pollution Emission Rates

	U.S. Average	Marginal*
NO_x	3.4 lb/MWh	0.6 lb/MWh
SO_2	7.9 lb/MWh	0.006 lb/MWh
PM_{10}	0.19 lb/MWh	0.07 lb/MWh
CO_2	1,408 lb/MWh	1188 lb/MWh

(* Large simple cycle gas fired turbine)


Nox Emission Rate (lb/MWh)
US Average All Generation
US Average Fossil Generation
US Average Coal Generation
Engine: Diesel, SCR
Engine: Diesel
Engine: Gas fired, 3-way catalyst
Engine: Gas fired, Lean Burn
Fuel Cell: Phosphoric Acid
Fuel Cell: Solid Oxide
Turbine: ATS Simple Cycle
Turbine: Small, Simple Cycle
Turbine: Microturbine
Turbine, Large Simple Cycle
Combined Cycle, SCR
3.40
5.10
5.60
4.40
12.70
0.40
2.10
0.03
0.01
0.30
1.00
0.40
0.60
0.06
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00

Actual Peak Load Reductions from Energy Efficiency & Load Management Programs U.S. 1992-1998



Recommendations:

- Consider environmental impacts in promoting demand response programs.
- Environmental regulations are needed for small distributed generation to protect air quality in urban airsheds.
- Give priority to clean DR options - energy efficiency, renewables, fuel cells.
- More info at: www.raponline.org